

Shaffer (N.M.) & Lovett (R.W.)

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OF THE
MECHANICAL TREATMENT OF
HIP-JOINT DISEASE

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SERVICE OF THE NEW YORK ORTHOPÆDIC
DISPENSARY AND HOSPITAL*

BY

NEWTON M. SHAFFER, M. D., NEW YORK

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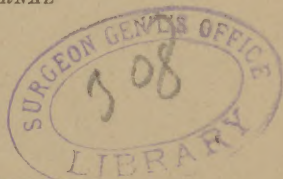
ROBERT W. LOVETT, M. D., BOSTON, MASS.

FORMERLY ASSISTANT SURGEON TO THE NEW YORK ORTHOPÆDIC DISPENSARY
AND HOSPITAL

*REPRINTED FROM
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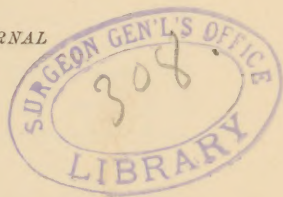
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ON THE ULTIMATE RESULTS OF THE MECHANICAL TREATMENT OF HIP-JOINT DISEASE.

*An Analysis of Fifty-one Cases occurring in the Service of the
New York Orthopædic Dispensary and Hospital.**

THE attention of the medical profession of late years has been largely directed to the operative treatment of hip-joint disease, and the results obtained by excision of the head of the femur have been quite freely discussed. The more conservative method of mechanical treatment has not, during this period, received the attention it deserves, and it is the object of this paper to present for the consideration of the profession certain facts which have been developed by a thorough and painstaking analysis of the results which have been obtained by the treatment pursued in the New York Orthopædic Dispensary and Hospital.

The cases upon which the following report is made are drawn from the dispensary class only; private cases and those from hospital or other sources, as well as those in which excisions have been performed, being eliminated from the list, the principal idea of the writers being to arrive at the *ultimate result* of the strictly mechanical treatment of the disease, and to present an analysis only of those in

* Read before the New York Academy of Medicine, May 5, 1887.

which the patients were the recipients of dispensary treatment.

Those who are familiar with the difficulties attending the medical or surgical control of an ordinary dispensary patient will at once appreciate the great difficulty of securing efficient home co-operation among the tenement-house class during the prolonged treatment of a typically chronic disease. And this is especially true when the treatment covers years, and when the successful issue of a case depends upon the intelligent use of an apparatus which requires constant attention. It is, however, under these circumstances that the treatment of the cases about to be reported was conducted, and some allowance as to the time consumed, etc., should be made. That the results are better in private practice, and sooner attained, no one, I think, will deny. It affords the senior writer of this paper great pleasure to record the fact, however, that the results reported were obtained under all the difficulties attending a dispensary practice among the poor, and he wishes, in this connection, to extend his thanks to the trustees of the institution for their generous co-operation and sympathy.

Indeed, it is among the objects of this paper to demonstrate that it is not only possible, but comparatively easy, to treat such a serious condition as hip-joint disease successfully, and even satisfactorily, with proper dispensary facilities. The latter include, of course, a well-equipped shop and a corps of mechanics to make, and to repair or alter, under the direction of a trained orthopædic surgeon, the necessary appliances, and the co-operation of one or more out-door visiting surgeons. Without these aids, we feel assured the results obtained would not have been so satisfactory as those we have to report. Another object of this paper is to show that it is the exceptional case, that of the homeless child or the child with utterly indifferent or very

poor parents, which requires *prolonged* hospital care in hip-joint disease. What the senior writer has frequently called "home treatment" enters largely into orthopædic dispensary work, and this means that an intelligent parent or an interested relative can, under proper instruction, carry out at home, in the great majority of cases, the directions of the surgeon, with occasional or periodical professional supervision.

There are, however, many poor children whose surroundings make hospital care necessary, as has been proved many times in our experience. But a well-equipped orthopædic dispensary, if properly conducted, can do the work of several large hospitals at a far less cost.

In the spring of 1886 the senior author of this paper requested Dr. Robert W. Lovett, of Boston, then an assistant surgeon of the institution, to personally investigate and to carefully record the *ultimate results* obtained by the conservative mechanical treatment of hip-joint disease practiced in the New York Orthopædic Dispensary and Hospital.

In order to arrive at positive and *ultimate* results, the following bases of investigation were formulated:

I. No case was to be considered which had not been under the care of the institution from the time of its entry to its final discharge.

II. No case was to be considered which had not been formally entered as "discharged cured" after a final examination.

III. No case was to be considered which had not been "discharged cured" at least four years prior to the investigation.

IV. No cases were to be considered except those which presented unmistakable signs of the disease at the time of the first examination.

V. None were to be considered which had not been at least two years under treatment.

VI. None were to be considered which were not seen or examined after the investigation was commenced.*

VII. All cases coming within these exclusive conditions were to be classified and reported.

While these exclusive conditions eliminate very many interesting and valuable cases which might have been legitimately added to the list, the writers of this paper believed that the facts brought out under the conditions named would have a positive value, and subject the methods pursued to more than an ordinary test. A much more brilliant, but perhaps not so scientifically accurate, statement might be made if the analysis covered *all* of the many other cases of hip-joint disease in which the patients had been discharged as cured, or if the time had been made six months instead of four years. It seems to the writers that the above-mentioned conditions must satisfy even the most exacting critic.

In order to further demonstrate the exclusive conditions under which this report is made and to arrive at approximate conclusions as to the percentage of deaths, we may state that for five of the years included in the seven from which the cases here reported are drawn—in other words, from 1877 to 1882—778 patients with hip-joint disease were treated. During these five years, 168, or 21·59 per cent., were discharged cured, and 50, or 6·4 per cent., died from conditions associated with or depending upon the chronic hip-joint lesion. The causes of death are as follows: Tubercular meningitis, 20; amyloid kidney, 5; phthisis, 3; exhaustion, 3; tubercular peritonitis, septicæmia, and convulsions, each 1; unknown, 16. These statistics regarding

* In two instances the final record was made in the dispensary just before this investigation was commenced.

death are approximately correct, as can be vouched for by the assistant surgeons who have prepared the reports of the institution.* Deaths from the ordinary diseases of childhood are not included, and, though some of the unknown sixteen were doubtless due to some intercurrent acute lesion, they have all been included among those dependent upon the joint lesion.

It may be stated that many, if not all, of the patients treated in the dispensary are *experimentally* discharged as cured before they are finally entered as *actually* cured. To explain: A patient answering to the tests we apply would be permitted to go without his apparatus as a matter of experiment for a few weeks, weekly observations being made in the mean time. In some instances symptoms would reappear during this preliminary trial after an indefinite period. The apparatus would then be reapplied, and experimentally re-

* Dr. Samuel Ketch, one of the senior assistant surgeons of the Dispensary, who, with the others mentioned, has had much to do with the preparation of the reports of the institution, furnishes the authors of the paper with the following information: In addition to the 168 discharged cured and the 64 who died (50 deaths only being due to the hip lesion) during the five years specified, 261 were "discharged relieved," 49 were "discharged for neglect," and 6 were "discharged as incurable." The 261 "discharged relieved" include all who were personally known by some member of the staff to be in a fair way to recover, the patients having, on account of change of residence, removal from the city, or some other cause, passed from under observation. The 49 "discharged for neglect" represent those who, after repeated trials, had failed to follow instructions. The 6 "discharged as incurable" comprise a small class for whom the opportunities of a favorable result were not possible in dispensary practice, and who could not be admitted into the hospital. They were not discharged on account of the pathological conditions present, for many apparently desperate cases have been carried to a successful issue by mechanical means alone. It was largely a question of deformity, not of disease, which gave rise to this classification,

moved again some months afterward, and this operation would be repeated until the final test of time proved that the recovery was permanent. The four years' limitation was introduced to cover the doubt that might arise regarding the permanency of the result, and all included in this report have been discharged as *actually* cured. The length of time some of the patients have been under treatment can be accounted for if these facts are duly considered.

The general plan of treatment may be briefly described.

In each case reported, a long Taylor traction-splint was applied soon after the first examination, and the parents or some friends of the patient were instructed in the use of the apparatus. The patient, unless recumbency was necessary to overcome a malposition of the limb, or unless the symptoms were so acute as to demand rest (in which case the patient was visited at home by the out-door visiting surgeon), was allowed almost unlimited exercise in the open air. He was instructed to call at the dispensary every week or two for observation and a readjustment of the apparatus, etc. If the patient's condition required recumbency for a month or more, and his home care was inadequate, he was placed in one of the wards of the institution, but was removed and placed in the dispensary service again as soon as walking was practicable.

The aims of treatment may be briefly summarized :

1. To overcome by mechanical means any acquired deformity that existed before treatment was commenced.
2. To protect the diseased joint from traumatism.
3. To permit the patient to have almost unrestricted out-door exercise, and
4. To maintain that position of the limb which would reduce deformity to the minimum if ankylosis occurred.

In short, the results here recorded were obtained by simple conservative measures, the protection afforded the dis-

eased articulation by the apparatus being the principal feature of treatment. In no case was any operative measure employed, except the occasional opening of an abscess, with in some cases full antiseptic precautions; in others by simple incision and ordinary dressing. But abscesses were not interfered with, as a rule, unless there were positive indications for the employment of the knife. And, as a matter of experience, abscesses connected with a suppurating hip joint did no better under antiseptic measures than those opened by simple incision, and neither did so well as those which were allowed to open spontaneously. "Cold abscesses" were allowed to take their own course, unless they were in a location which interfered with the use of joint protection. Little or no medication was employed.

But these patients were as carefully watched as the exigencies of dispensary practice would allow. If they failed to report to the dispensary as regularly as directed, they were written to and requested to call, or in many instances they were visited by some one of the assistant medical staff. Indeed, although these patients were wholly from the poorer classes, many of them living in the ordinary tenement-houses, and had in very many instances very bad attention at home, they were cared for under the judicious management of the trustees of the institution by a very earnest and thorough corps of assistant surgeons.

And to these assistant surgeons much credit is due. When it is said that among them may be mentioned Dr. Samuel Ketch, Dr. John F. Ridlon, Dr. T. L. Stedman, Dr. Henry W. Berg, Dr. E. D. Simpson, Dr. Leroy W. Hubbard, and the late Dr. Simeon A. Foster, of this city, Dr. A. Sydney Roberts, of Philadelphia, and Dr. George B. Packard, of Hartford, the character of the work performed needs no further comment.

As affecting the question of result, it may be stated that

the long splint, without any joint at the knee, was used from the beginning to the end of mechanical treatment. In private practice, an intermediate splint allowing either hip or knee-joint motion, or both, is almost always used during the period of vulnerability of the joint, after the active symptoms have subsided. This intermediate splint is expensive, and for that reason not available in dispensary practice. It is altogether probable that better results, as regards both ultimate position and motion, would have been recorded in many cases had this intermediate apparatus been employed.

Before giving the results of the investigation, it may be well to say that it was first proposed that a detailed statement of each case should be made in this paper before giving an analysis. But the length of an essay presenting this amount of detail would be such that it would be impossible to read it in one evening. Hence it is that our conclusions only are recorded, but only after a patient and very exhaustive examination.

Of the patients with hip-joint disease who were under the care of the institution, and who were discharged as cured from 1875 to 1882, there were found among the number which were available under the exclusive conditions of this investigation 51 which could be traced. Many had disappeared, and prolonged and diligent search failed to find them. In the years that had elapsed they had moved to other places, leaving no trail by which they could be followed. A considerable number were inaccessible.

Of the 51 patients traced, 4 had died—2 of meningitis, probably tubercular, 1 four months, the other six years after discharge, and 2 of pneumonia, seven and ten years respectively after discharge, having been in robust health up to the time of their last illness. Six had relapses. They

had been under treatment $2\frac{1}{2}$, 4, 4, 4, 5, and 7 years respectively. In 1 case the apparatus was removed without the knowledge of the surgeon, but in the 5 others treatment was discontinued only after the joint symptoms had ceased for some months, and the patient could hop, run, and perform other active movements with the affected limb. One of these (the one whose splint was removed at home) remained well two years; 2 were well three years, 2 four years, and 1 five years before relapse occurred. In 1 case relapse occurred from a severe fall from a cart, but in the other cases no cause could be ascertained. As to the progress of these 6 patients with relapse, 1 had excision of the hip performed at one of the hospitals, and was still in bed after the lapse of one year, 2 are still wearing traction-splints and are nearly well a second time, 1 is on crutches and is slowly improving, and the remaining 2 have been cured a second time by the traction apparatus. The remaining 41 patients were seen at their homes and were carefully examined, with the exception of 2, who were reported to be in excellent health, and walking well at the end of four and six years, respectively. The remaining 39 were carefully examined and measured. These 39 patients had been discharged as cured during the period mentioned (from 1875 to 1882), and had been under treatment as follows:

TABLE I.

Showing length of time under treatment.

| | | | |
|---------------------------|----------|---------------------------|-----------|
| 2 years..... | 4 cases. | 6. years..... | 1 case. |
| $2\frac{1}{2}$ years..... | 4 " | $6\frac{1}{2}$ years..... | 1 " |
| 3 years..... | 9 " | 7 years..... | 1 " |
| $3\frac{1}{2}$ years..... | 6 " | 8 years..... | 1 " |
| 4 years..... | 8 " | Total..... | 39 cases, |
| $4\frac{1}{2}$ years..... | 2 " | | |
| 5 years..... | 2 " | | |

When these 39 patients presented for their first examination, the disease had been in progress, as stated by the parents or friends accompanying the patient, as follows :

TABLE II.

Showing length of time disease had existed prior to the commencement of treatment.

| Length of time. | Cases. | Length of time. | Cases. |
|----------------------------|--------|-----------------------------|--------|
| Less than 6 months..... | 8† | 7 years | 1 |
| Six months to 1 year*..... | 18‡ | 9 years | 1 |
| 2 years | 3 | For an indefinite time..... | 2 |
| 3 years | 5 | | |
| 6 years | 1 | Total..... | 39 |

It can readily be appreciated, from studying the foregoing tables, that the cases reported are unselected. They represent all phases and conditions of hip-joint disease such as are likely to present in every-day dispensary work.

Of the 39, 27 had one or more abscesses at some stage of the disease, and 12 had none. But the latter were by no means the less marked cases or the ones followed by the best results.

Although, in the foot-notes above, an attempt has been made to express in degree the results obtained in certain cases, the difficulty of conveying a definite idea as to results in this manner leads us to state definitely, in tabular form, when possible, the actual results obtained.

* Of those applying with a history covering less than one year, 19 gave a definite time. Two weeks, 2 cases; 4 weeks, 1; 8 weeks, 2; 4 months, 2; 5 months, 1; 6 months, 5; 7 months, 2; 8 months, 2; 9 months, 1; 10 months, 1.

† Of the 8 cases where disease had existed less than 6 months, the ultimate result was as follows: Perfect, 2; excellent, 2; good, 1; fair, 1; poor, 1; indifferent, 1.

‡ Of the 18 cases where disease had lasted from 6 months to one year, the ultimate results were: Excellent, 1; good, 4; fair, 11; poor, 2.

First, we will consider the difference in the length of the lower extremities.

The difference in the length of the legs, measured from the anterior superior spine of the ilium to the inner malleolus, was, when any difference existed, from half an inch to two inches and a half, with two exceptions. One patient, with dislocation of the head of the femur, had six inches shortening, and one (without abscess) had three inches. Two had absolutely no shortening. The amount of shortening did not seem to depend upon the presence or absence of abscess. The case with six inches shortening and dislocation ran its entire course without evidences of suppuration, while, on the other hand, the patients in whom there was absolutely no shortening each had abscesses. One of these children with no shortening had six distinct sinuses, the other two. It will be seen from a study of the following table, however, that the cases where abscess was present show more shortening than the others :

TABLE III.

Showing the relation of the presence or absence of abscess to shortening of the limb.

| Shortening, in inches. | Cases with abscess. | Cases without abscess |
|------------------------|---------------------|-----------------------|
| 0..... | 2 | .. |
| $\frac{1}{2}$ | 1 | 1 |
| 1..... | 5 | 5 |
| $1\frac{1}{2}$ | 4 | 3 |
| 2..... | 8 | 1 |
| $2\frac{1}{2}$ | 5 | .. |
| 3..... | .. | 1 |
| 6..... | .. | 1 |
| Total..... | 25 | 12 |

The influence of age upon the ultimate amount of shortening is worthy of study.

In reaching conclusions on the point, the cases were divided into two classes:

1. Those in which the disease ran its course, and was cured before the age of ten was reached; and

2. Those in which the disease began at, or continued beyond, the age of ten years.

Table No. IV. has been prepared to show the effect of early and late disease.

TABLE IV.

| Cases cured before 10. | Cases cured after 10. | Shortening in inches. |
|------------------------|-----------------------|-----------------------|
| 2..... | .. | 0 |
| 1..... | 1 | $\frac{1}{2}$ |
| 6..... | 4 | 1 |
| 5..... | 2 | $1\frac{1}{2}$ |
| 3..... | 6 | 2 |
| —..... | 5 | $2\frac{1}{2}$ |
| 1..... | .. | 3 |
| —..... | 1 | 6 |

Eighteen cases cured before ten years represent an aggregate of twenty-five inches of shortening, while nineteen cured after ten represent thirty-eight inches of shortening.

In studying the general effect of shortening, it was found that it existed principally in the femur, though the tibia shared in it to a lesser extent also. The shortening of the thigh was ordinarily about two thirds of the whole, but sometimes it was less, and in one case of two inches and a half shortening it was wholly in the femur. In two cases, where there was a considerable shortening of both femur and tibia, the fibula seemed much less affected than the other bones. When there is much shortening of the leg, the foot of the affected side is also smaller than the other.

The difference in the length of the legs almost always

increases slightly after the disease is cured. At the time of discharge from the dispensary, careful measurements were made and recorded in twenty cases. At that time the shortening varied from half an inch to an inch and a half, and in only four cases was it as much as two inches. Several years afterward these cases showed, almost without exception, an increase in the amount of shortening. In five cases it was an inch or less, and the rest showed from one and a half to two and a half inches difference. The legs had grown meantime five, ten, or even fifteen inches, so that the shortening was not in any case excessive. It also seems that the shortening does not increase indefinitely, for, in the cases where eight or ten years had elapsed between the two measurements, there was no greater shortening than when three, four, or six years had elapsed.

The difference in the circumference of the thighs, measured at the middle, was from one to three inches. In one case it was four inches, but the majority were between one and two inches. No constant increase or decrease took place as the years went by, some cases showing more atrophy than five years before, and some showing just the same comparative difference. The wasting, however, did not disappear, and in no case, even when the restoration of the joint was perfect, was the difference in the circumference of the two thighs less than one inch. Nor did the amount of atrophy at the time bear in the history of the disease any constant relation to the amount of shortening. It would appear that there may be a maximum of muscular atrophy with a minimum of bone shortening, and *vice versa*.

The atrophy of the muscles of the calf behaved in much the same way, except that it grew less in the course of years much oftener than the thigh atrophy did. It ranged from an inch to an inch and a half, and was ordinarily one

half or one third as much as the atrophy of the thigh. In a word, it is apparent that the nutrition of the bones and muscles of the entire limb receives in hip-joint disease a shock from which it never entirely recovers.

No treatment was used to develop these atrophied muscles. The use of electricity, massage, etc., would probably have resulted in much better muscular development, as has often been the case in private practice.

Nineteen cases were found with practically ankylosed joints, six with slight motion in flexion, seven with motion in flexion of from 10° to 45° , and a certain amount of motion in other directions; three with motion to a right angle in flexion, and good rotation and abduction, and three were found with *perfectly free motion in every direction*.

It is very interesting to see from the subjoined table that the presence or absence of abscess seems to have but little influence upon the amount of motion after final recovery from the disease.

TABLE V.

Showing the influence of the presence or absence of abscess upon joint-motion.

| Condition of joint as regards motion. | One or more abscesses. | No abscess. | Total. |
|--|------------------------|-------------|--------|
| | Cases. | Cases. | Cases. |
| No motion in joint. | 12 | 4 | 16 |
| Slight motion. | 4 | 2 | 6 |
| 10° to 45° of motion. | 5 | 2 | 7 |
| 90° of motion. | 3 | .. | 3 |
| Perfectly free motion. | 2 | 1 | 3 |

Examination proved that the amount of motion grows less as time goes by. At the time of discharge several of these patients had a certain recorded degree of motion of the affected articulation. This motion had entirely disappeared a few years later, and in this table these cases figure

as cases of ankylosis. Two patients in whom 90° of flexion was possible six years ago, had only 30° when examined in 1886. In no case was it noted that joint motion had increased since the final discharge and record. It almost invariably grew less.

An important practical point, as regards the use of the limb and locomotion in cases where ankylosis takes place, is the position in which ankylosis occurs. In 15 of the cases where there was little or no motion at the articulation there was no flexion of the thigh. The limp in these cases was trivial. In other cases the thigh was flexed at an angle of 120° to 135° with the horizontal plane of the body. This was not a serious impediment to locomotion when a flexible dorso-lumbar spine and a sound hip joint on the opposite side existed, but in one case there was caries of the lumbar spine, and in this case there was very difficult locomotion. Flexion to 135° with a normal spine does not produce either difficult locomotion or a bad gait, and in no case examined did the permanent flexion exceed this angle.

Permanent *adduction* is a more important matter. Of 24 cases it was very slight or absent in 13, in 8 it equaled 10° to 15° , and in 3 cases it was about 30° . In two cases there was slight abduction of the thigh, and in one of these there was a condition of superextension of the knee. But even in this condition the patient walked well. In cases where abduction was present in the earlier history of the disease, adduction was found in the late history; and adduction is likely to occur after the removal of the splint, and to increase up to a certain point. But, as shown above, adduction to 30° occurred in only three cases, and in only one of these was it troublesome. In this case the slight flexion, with adduction to 30° , a real shortening of one inch and a half became, for the practical purpose of locomotion, a shortening of four inches.

It is desirable to maintain the parallelism of the limbs if possible. If the patient can place the limb squarely under the pelvis, locomotion is comparatively easy, even if flexion is present, and in cases where it is possible a protective, intermediate, perineal support with joints at the hip, knee, and ankle should be worn to prevent the adduction which is very apt to occur after the removal of the unjointed traction apparatus.

When the hip joint is stiff the dorso-lumbar spine and the unaffected hip joint have to do the work ordinarily performed by the two normal hip joints. After prolonged walks or over-exertion in locomotion it was common for those examined to complain of backache. But this was only temporary, and disappeared after rest.

One or two were subject to slight attacks of pain in the hip in damp weather, but there was no sign of disease, and a relapse was not anticipated. Their health seemed perfect. Pain and weakness of the ankle on the affected side was common, and non-deforming club-foot or an inability to flex the foot beyond a right angle was present in twenty cases and absent in thirteen. The rest were not noted. It was, of course, most apt to be present when real or practical shortening made it necessary to reach down with the toes at every step. One patient was in a condition of acquired talipes equinus.

A very careful examination was made as to the presence of lateral curvature of the spine in nearly every case. There were some forty individuals examined, all of whom had some difference in the length of their lower extremities. The difference varied, as above noted, from half an inch to six inches. They had, nearly all of them, this difference when they entered upon puberty. The conditions are those that we have been taught to believe are most potent in the production of true lateral curvature. Habitual malpo-

sition of the spine in standing, walking, or even in sitting was present in many cases. And yet in only one case of the whole forty was there anything that approached true lateral curvature. One girl, aged fourteen, had a slight but distinct lateral curve in the dorsal region, and a still smaller curve in the lumbar region. There was slight rotation of the vertebræ, as shown by the position of the ribs, when extreme anterior flexion of the spine was executed. The lateral curve was almost wholly obliterated when the patient was placed on her face and the pelvis was straightened, but the rotation persisted in a slight degree. There was no lateral rigidity of the spine. She had two inches true shortening of the left leg, which was practically three inches in the standing position on account of 15° adduction and slight flexion. There was in this case an incidental curve of the spine due to the tilted pelvis, but in many respects the curvature lacked the characteristics of true rotary scoliosis.

It appears from our investigations that the amount of shortening of the leg is not dependent on the presence or absence of abscess, that it is less in children who are cured before ten years, and that it apparently increases after that age is passed. It also appears that shortening increases slightly after the joint disease is arrested, which seems to prove that the affected limb did not grow so fast as its mate.

Muscular atrophy is always present in hip-joint disease. It persists after the disease is arrested and the apparatus is removed, and it may often improve after treatment is stopped, but never wholly disappears.

The amount of motion in the joint when the disease is arrested and the apparatus is removed is very apt to diminish somewhat in the course of years; but recovery with perfect motion is not impossible, or indeed unlikely. The

presence or absence of abscess has no apparent effect on the amount of motion obtained.

Ankylosis being the result most likely to occur, it is important to study the ultimate position of the limb, so that, if ankylosis occurs, the most useful position will result.

Adduction, rather than flexion, is the ultimate position to be avoided, and adduction is apt to occur after the joint seems to be free from inflammation and the apparatus is removed.

Non-deforming club-foot, or even a considerable degree of acquired talipes equinus, may occur when there is much shortening of the leg with flexion of the thigh.

True lateral curvature with rotation occurs very exceptionally, if at all; as the result of even great inequality in the length of the lower extremities, only one case being found in the series, and that not a true rotation curve.

A comparison of the results here reported with the published results of excision of the head of the femur leads the authors of this paper to the conclusion that the conservative methods of treatment here described promise much better ultimate results than excision of the joint, aside from the greater mortality attending the operation.

We may briefly summarize the results of our investigations as follows: Of 51 patients discharged as cured over four years ago, 4 have died, 6 have had relapse, and 41 have apparently been cured of the disease. Of the 4 who died, 2 only had presumably tubercular disease, the other 2 dying of an acute lesion. Of the 6 who had relapse, 2 are now under active treatment with a prospect of a speedy cure, and 2 have been cured a second time. One has been in bed a year after excision of the joint, the other is on crutches. Of the 41 who recovered there is not a single individual who is incapacitated from doing a full day's work at his or her trade or occupation. Only one, a boy who had suffered from

both Pott's disease and hip-joint disease, used a cane, and none used crutches. There are, among those who recovered, printers, glaziers, machinists, errand-boys, shop-girls, dress-makers, and many children attending the public schools—all at their work and none with evidences of active tubercular disease or any serious incapacity arising from the condition for which they were treated years before.



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